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CARNIVOROUS PLANT NEWSLETTER

Journal of the International Carnivorous Plant Society

Volume 31, No. 4 December 2002

CARNIVOROUS PLANT NEWSLETTER

Journal of the International Carnivorous Plant Society
www.carnivorousplants.org

Volume 31, Number 4
December 2002

Front Cover: *Drosera cuneifolia* flowers. See article on page 100.

Back Cover: Mike King's giant *Sarracenia flava* var. *rugelii*. Photo by Mike King. See article on page 120.

Carnivorous Plant Newsletter is dedicated to spreading knowledge and news related to carnivorous plants. Reader contributions are essential for this mission to be successful. Do not hesitate to contact the editors with information about your plants, conservation projects, field trips, or noteworthy events. Contributors should review the "Instructions to Authors" printed in the March issue of each year. Advertisers should contact the editors.Views expressed in this publication are those of the authors, not the editorial staff.

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Date of effective publication of the September 2002 issue of Carnivorous Plant Newsletter: 6 September 2002.

The ICPS is the International Cultivar Registration Authority (ICRA) for cultivated carnivorous plants according to The International Code For The Nomenclature of Cultivated Plants. Send relevant correspondence to the ICPS, Inc.

PUBLISHER: ICPS, Inc., Fullerton, California. Published quarterly with one volume annually. Desktop Publishing: Steve Baker, 5612 Creek Point Drive, Hickory, NC 28601. Printer: Kandid Litho. Logo and masthead art: Paul Milauskas. Dues: $25.00 annually. Reprints available by volume only

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ISSN #0190-9215.

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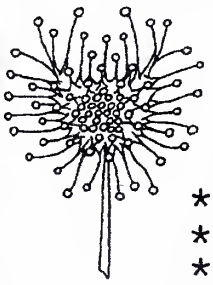

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International Correspondent

Drosera cuneifolia and *D. admirabilis*: Two Rosetted Sundews from the Cape Province, South Africa

Robert Gibson • PO Box 1330 • Dubbo • NSW, 2830 • Australia

Keywords: observations: *Drosera admirabilis*, *Drosera cuneifolia*, South Africa.

During three months in South Africa I had the very good fortune to explore many areas, including the fynbos region. Fynbos is a shrubland vegetation type endemic to the Cape Floral Kingdom that is phenomenally rich in endemic species. It occurs predominantly over infertile soils and invariably includes heath-like shrubs, particularly *Ericas*, grass-like *Restios*, and bulbous herbs and experiences frequent fires (Cowling and Richardson, 1995).

During this time I had the opportunity to see the attractive *D. cuneifolia* and *D. admirabilis* in the wild. The former is endemic to the Cape Range, including Table Mountain (Figure 1). It is a handsome species reaching 8 cm across, with broad, wedge-shaped leaves to 1.5 cm wide at the truncate leaf apex (Figure 2). The leaves have an incomplete cover of appressed white hairs on the lower surface. The lower surfaces of the largest leaves are almost completely hairless. The short ovoid stipule is minutely notched at its blunt apex.

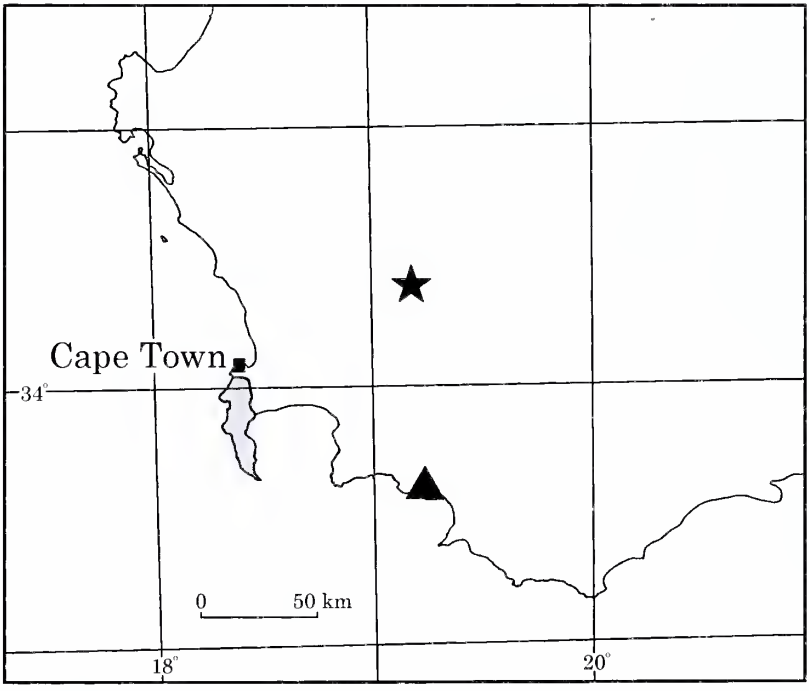

Figure 1: Distribution of *D. cuneifolia* (grey shading), *D. admirabilis* (triangle) and *D. sp.* "floating" (star) in southwest South Africa. *Drosera admirabilis* is likely to be more widespread; the type was collected west of the triangle at an unspecified location, and the enigmatic *D. sp.* "floating" may be conspecific.

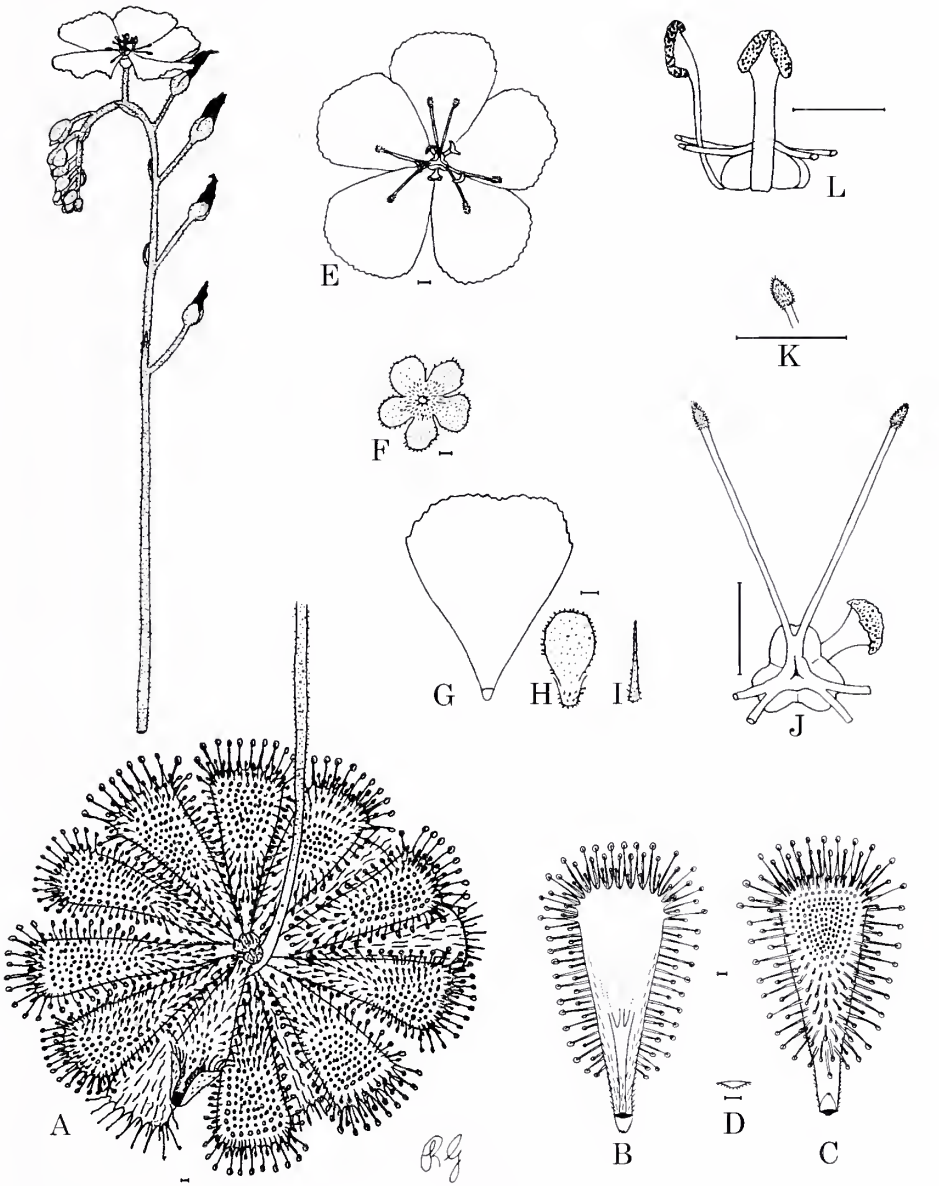

Figure 2: *Drosera cuneifolia*. A: Rosette, 6 cm in diameter; B: leaf lower surface, note the few hairs near the leaf base; C: leaf upper surface, note the absence of hairs; D: leaf cross-section; E: open flower; F: calyx; G: petal; H: sepal; I: bract; J: ovary, partial view of styles and one stamen; K: stigma; L: ovary, two stamens and the base of the styles. Scale bars=1mm. Illustration by R. Gibson.

In late spring some *Drosera cuneifolia* plants produce a robust scape. It is erect from the base and bears up to 20 flowers in a one-sided inflorescence. Flowering has been recorded between November and January (Obermeyer, 1970). The flowers are large and attractive (see Front Cover) up to 3 cm across and remain open between 8 am and 4 pm (in Cape Town). The ovary is surmounted by three styles that are bifid from the base to produce six style segments. Each style segment is typically entire, although minutely bifid style apices are occasionally produced. The tip of the stigma is hairy. The green ovary is surrounded by five erect stamens. Each filament is white, and is expanded at the apex where the two anthers are located. The almost orbicular sepals overlap each other markedly in bud. Observations on plants in cultivation and the wild indicate that this species is self-incompatible. The seeds, not seen, are recorded by Obermeyer (1970) as fusiform.

I observed *Drosera cuneifolia* at two locations in 1997. The first was at the southern part of Table Mountain, near Constantia Neck, where the plants grew near a small creek in the company of *D. aliciae*. The second was to the south at the Silvermine Nature Reserve, where several populations were seen within a single valley. Here the plants grew in a range of intermittent drainage lines and wetlands in substrate consisting predominantly of quartz sand and a variable amount of organic matter.

At Silvermine I observed that plants often formed clonal colonies up to 30 cm across, probably from buds generated along the thick roots of established plants (Figure 3). Only a few plants per colony flowered, and I observed pollen on the stigmas of many flowers, so insect pollinators must have been active. Mysteriously very few flowers set seed that season. Rosettes in exposed conditions died down as summer progressed, and it appears likely that the species survives as dormant roots during dry conditions. This ability would also serve this species well in surviving the not infrequent fynbos fires.

I studied *Drosera admirabilis* in the Kleinriviersberge near Hermanus, 90 km south east of Cape Town. Eric Green (a very well known carnivorous plant enthusiast in Cape Town) and I visited this site several times, and had been literally walking over plants of *D. admirabilis* without recognising them as different from the sympatric *D. aliciae*! *Drosera admirabilis* forms compact, reddish rosettes up to 4 cm across, consisting of narrowly wedge-shaped leaves with a rounded apex (Figures 4, 5). The stipule is small, triangular and distinctly divided into three segments. The leaf lower surface has a sparse cover of appressed hairs, and is glabrous at the apex. The scape base is typically vertical, but can be weakly ascending (Debbert, 1987), and bears up to 15 flowers. These have light pink petals and are up to 2 cm across. The flowers close by 3 pm. Unlike *D. cuneifolia* the styles flare at the apex into two fan-like lobes. The stamens have filaments which widen uniformly towards the anthers and the obovate sepals weakly overlap in bud. In cultivation, the flowers appear to be self-compatible, and automatically self-pollinate as they close. A flowering plant of this species appears in extreme lower left of the colour plate of *D. slackii* in Gibson (2000: p. 108).

Drosera admirabilis grows in wet peaty swamps along drainage lines, in the company of *D. aliciae, D. capensis, D. slackii, D.* × *corinthiaca* (=*D. glabripes* × *aliciae*) and *Utricularia bisquamata*. It superficially resembles small plants of *D. aliciae*, but can be distinguished readily by observing the leaf lower surface and flower structure. It was interesting to note that during my site visit in December 1997, flowers of all sundews mentioned above, save for *D. aliciae*, were open under the ambient temperature conditions (of about 30°C), suggesting that these sympatric species have differing pollination ecology.

Figure 3: A colony of *Drosera cuneifolia* at Silvermine.

Figure 4: *Drosera admirabilis*.

A plant very similar to *D. admirabilis* occurs 100 km to the north of Hermanus, in a creek that supports the most accessible *D. regia* population known. This sundew forms a compact reddish rosette up to 4 cm across of narrowly cuneate leaves, each with a rounded apex. The few hairs on the leaf lower surface are concentrated at the base, whilst the remainder is dotted with small, sessile red glands. The scapes in cultivated plants in Cape Town have a strongly ascending base, and the seeds are up to 1 mm by 0.2 mm. The flower structure has not yet been documented. However, photos of the open flower taken by Nigel Hurneyman (Figure 6), show that it has style segments that divide at apex into two, or more narrow triangular stigmas. Thus the flower structure is very like that of *D. admirabilis*.

This incompletely known sundew is widely grown in cultivation under the name of *D. sp.* "floating". The name has an amusing history, and has caused some confusion for those attempting to cultivate this plant. Some enthusiasts have incorrectly interpreted the name to indicate that this is a fully aquatic species! In nature it grows in a shallow, gravely creek bed where many plants have to cope with up to 5 cm of clear water. In this situation the plants produce flexible stems to bring the rosette to the surface of the water but have their roots firmly anchored in the substrate. When Eric first saw these plants he found, to his amusement, that these rosettes could be moved about the water surface on their flexible stems and thus appeared to be floating. This sundew grows happily in drier soil beside the creek, and in this condition remains a flat rosette.

All three sundews are well established in cultivation, especially in western Europe. Some seed-raised plants of *D. cuneifolia* in England have been observed to develop an undulose leaf margin and have been referred to with the invalid name "*D. cuneifolia* var. *undulata*." These plants originated from seed collected at Silvermine (E. Green, pers. comm, 1998).

Taxonomy

Drosera cuneifolia was amongst the first sundews to be formally described (Linnaeus, 1753), mysteriously predating the formal description of the much more widespread *D. aliciae* (Hamet, 1905) by 152 years. In 1987 Debbert described *Drosera admirabilis*, but it was reduced to synonymy to *D. cuneifolia* by Schlauer (1996, 2001). In the revised *Drosera* key (Schlauer, 1996, p. 79), *D. admirabilis* was reduced to synonymy with *D. cuneifolia* based on cuneate leaf shape with an indistinct petiole, sparse hairs on the leaf lower surface, swollen stigma and styles not repeatedly forked. From my own observations these taxa differ in leaf shape, leaf lower surface hair cover, and the amount of style division; perhaps due to introgression with *D. aliciae* in *D. admirabilis*. These and other differences are summarised in Table 1 below.

	D. cuneifolia	*D. admirabilis*
Max. leaf length	20 - 40mm	16 - 20mm
Leaf apex	Truncate	Obtuse
Stipule	Obscurely 3-lobed	Fully 3-lobed
Scape base	Erect	Erect to weakly ascending
Filament shape	Spathulate	Narrowly cuneate
Stigma	Simple, terete; rarely barely bifid	Divided into two fan-shaped lobes
Cytology	2n=32	2n=40
Distribution	Cape Range	Kleinriviersberge and The Kogelberg

Table 1: A summary of key differences between *D. cuneifolia* and *D. admirabilis* based primarily from my own observations, with additional details from Obermeyer (1970), Kondo (1976) and Debbert (1987).

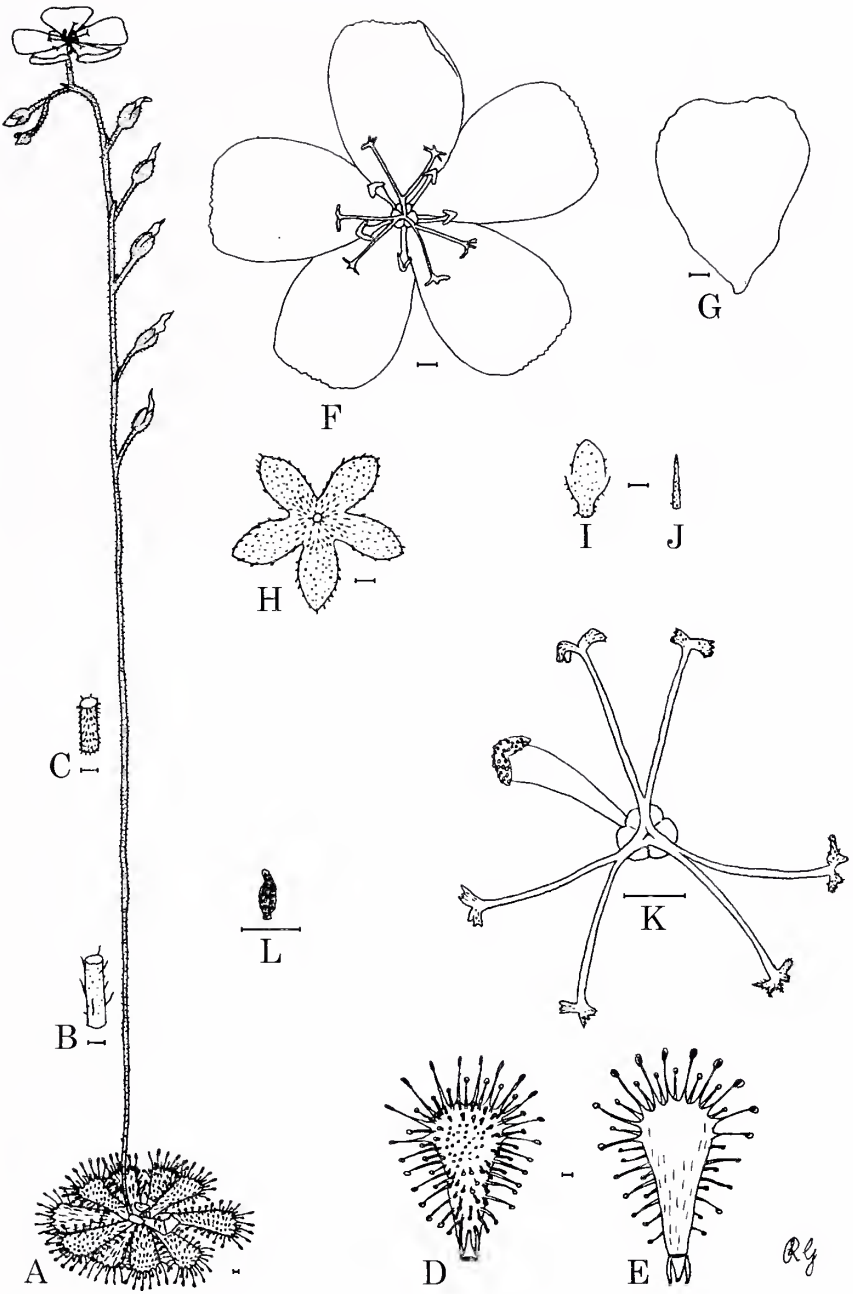

Figure 5: *Drosera admirabilis* from the Kleinriviersberg, collected by Fernando Rivadavia, and grown by Eric Green. A: Whole plant in flower; B: basal portion of the scape with long eglandular hairs; C: typical shortly-glandular hairy indumentum of the scape; D: leaf upper surface; E: leaf lower surface, note the distribution of hairs; F: open flower; G: petal; H: calyx; I: sepal; J: bract; K: gynoecium with one of the five stamens; L: seed. Scale bars=1mm. Illustration by R. Gibson.

Figure 6: *Drosera cf. admirabilis* (100 km north of Hermanus), plants in cultivation. Left: close-up of whole flower. Top right: close-up of anthers showing broad connective. Bottom right: close-up of upper portion of styles and stigmas showing apical ramification. Photographs by Nigel Hurneyman.

Species may be defined a number of ways, e.g. by morphological, genetic and environmental differences, and also by genetic isolation (Snow, 1997). Within the genus *Drosera*, species boundaries have been most commonly erected based on floral structure, plant morphology, cytology and pollen structure (Diels, 1906; Schlauer, 1996). From the features outlined in the above table it is suggested that *D. admirabilis* and *D. cuneifolia* are best treated as separate species, whilst freely acknowledging that they are members of the same subgenus and section of the genus (subgenus *Drosera*: section *Drosera*).

Both taxa are amenable to cultivation, especially *D. admirabilis* which thrives in conditions suitable to the sympatric *D. capensis* and *D. aliciae*. *Drosera cuneifolia* hails from better-drained soils and thus does best in a more open mix (i.e. more air gaps in the medium). Eric found it did well in fern fiber rather than peat moss, and other open organic mixes are also likely to be suitable. Using a large pot may also provide optimum conditions, and as a bonus will readily accommodate its large root system. Both species may be propagated by leaf cuttings and seed. Root cuttings are also likely to work.

In conclusion, *D. cuneifolia* and *D. admirabilis* are distinctive rosetted sundews from South Africa. They have many different features but it is noted that the still-mysterious *D. sp.* "floating" appears allied to *D. admirabilis* and requires further study.

Acknowledgements

I wish to thank Dr. John Rourke and the other helpful staff at the Compton Herbarium for granting study access to the collection, and Dr. Neville Marchant of the Western Australian herbarium for his support with the herbarium study aspects of this paper. I am grateful to Stan Lampard and Thomas Carow, and other growers, for the many stimulating conversations on these sundews in cultivation. This work would not have been possible without the very generous support and friendship of Eric Green and his family in Cape Town.

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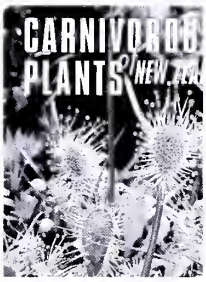
News and Views

Lubomír Adamec and Kamil Pásek (adamec@butbn.cas.cz; csper@volny.cz) write: "We are greatly honored to introduce our new website on *Aldrovanda vesiculosa* to the world-wide "carnivorous" public. The website (www.BestCarnivorousPlants.com/aldrovanda/) has just been completed and is freely accessible. This specialized website on *Aldrovanda* includes all possible aspects of this very rare aquatic carnivorous plant. The website contains complete on-line texts of the most important papers on *Aldrovanda*. It is subdivided into the following chapters: Photo gallery, Literature references, Important papers available on-line, News and views, *Aldrovanda* for sale, *Aldrovanda* web links, Help us!, Sponsorship of research, and Persons involved with *Aldrovanda*. We will be happy if this website brings useful pieces of knowledge of *Aldrovanda* to readers and carnivorous plant growers and will also be grateful for any interesting feedback."

(Editor's note: While we do not want CPN to be used to describe every new carnivorous plant web site, we decided to print this to remind ICPS members of the interesting resources available to them on the internet. This and other web sites can be found on the ICPS web ring, at www.carnivorousplants.org.)

John Green (jsg16@utah.edu, 1025 MacFarland Dr., Salt Lake City, UT 84116 USA) wrote the following to the carnivorous plant listserve, and it deserves reprinting in CPN: "I remember someone a while back explaining that they feed drops of milk to their *Pinguicula* with good results. A month or two ago while examining my plants I swatted a mosquito that had been making a meal of me. Somehow I didn't smash it so the abdomen was still full of my blood. I dropped it onto a little *Pinguicula* 'Sethos' × *gypsicola*. When I looked a day or two later the blood had run out onto several leaves, and shortly after that the mosquito got kind of moldy so I picked it off. But since then the plant has nearly doubled in size and it is putting out much fatter leaves than ever before. It has always grown well for me but this is the best it has ever looked. Maybe next time I get a cut I'll go feed my plants.

Book Review



Salmon, Bruce. 2001. Carnivorous Plants of New Zealand. Ecosphere Publications, Auckland. 0-473-08032-X, 305 p., approximately 190 color photographs, figures and maps. Paperback, 15.5 × 21 cm (6 × 8.25 in), approximately $US31, shipping extra.

Reviewed by Barry Rice

When I first heard that Bruce Salmon, a well known carnivorous plant figure, was writing a book about New Zealand carnivorous plants, I was a little bemused. I anticipated that the "book" would be more like a small pamphlet since New Zealand only has about a dozen species of carnivorous plants (*Drosera* and *Utricularia*).

When my copy of the book arrived, was I ever surprised! Salmon managed to fill more than 300 pages about carnivores in New Zealand (and also those in the Chatham, Stewart, Aukland, and Campbell Islands). And what is more, after I read the book I felt that it made sense that he included all the information that he did. Basically, I love this book!

First, the illustrations are marvelous. Salmon has beautiful field photographs with intense color and masterful control of depth of field that make the botanical subjects pop out. Salmon's botanical line drawings are superb. They are detailed, accurate, and effective at capturing the nature of the plants.

Now, as to the book's scope. Salmon discusses seven *Drosera* species: *D. arcturi*, *D. auriculata*, *D. binata*, *D. peltata*, *D. pygmaea*, *D. spatulata*, and *D. stenopetala*. A few of these species have many forms and varieties, and Salmon treats them all nicely. (This book is worth the price for the photographs of *D. stenopetala* alone!) There are also about six *Utricularia*: *U. australis*, *U. delicatula*, *U. dichotoma*, *U. geminiscapa*, *U. gibba*, and possibly *U. macrorhiza*. This *Utricularia* list is very interesting for a few reasons. First, you will notice that Salmon has omitted *U. novae-zelandiae* and *U. monanthos*; he has subsumed both of these species into a more broadly defined *U. dichotoma*. Second, the *U. geminiscapa* is of extremely limited range in New Zealand—indeed it may be extinct from the islands. Third, the *U. macrorhiza* on the above list is a plant that Salmon discusses as of an uncertain identification. The arrivals of both *U. geminiscapa* and the putative *U. macrorhiza* are both quite recent, and may be either by birds or human activity.

In addition to the species-by-species descriptions of the plants in this book, Salmon included extensive information about New Zealand climates, habitats, ecology, etc. The next time I visit New Zealand, I will certainly bring this book.

Carnivorous plant enthusiasts must absolutely buy this book. Eventually it will be out of print, its price will sky rocket, and you will rue how you failed to buy the book when you could have so easily and inexpensively. You can buy this book directly from the author (http://www.geocities.com/nz_cp/) or Triffid Park (see advertisement in this issue for contact information), or other carnivorous plant book sources.

Looking Back: CPN 25 years ago

Owen Tallman wrote of a surprising incident involving a barn swallow that got caught by the sundews in his greenhouse: "I was about to grab him when I realized that he wasn't going anywhere. He had landed all right, with his wings spread, but that was what did it—the combined sticking power of this army of sundews had got him wing, foot and tail... I watched him struggling for a few moments to be certain that he was caught...."

ICPS on the World Wide Web: Carnivorous Plant E-mail Listserv Archive

John Brittnacher • P.O. Box 72222 • Davis, CA 95617-6222 • USA

Keywords: computers: internet

The ICPS web site now has an archive for the carnivorous plant e-mail listserv, spanning the past seven years. The archive includes 30,000 e-mail messages related to carnivorous plants. You can browse the archive or search for postings on a particular topic.

Got a question about carnivorous plants? The answer could be in one of those messages. Chances are it is in ten messages! A common topic each summer is squirrels. There were 173 postings in a three-year period! There were five postings about *Nepenthes hamata*, twenty-five on *Drosera hamiltonii*, seven on carnivorous plants being found near volcanoes and asteroid impact zones, and 78 on fungus and fungicides. Are all those messages gems? Of course not. Be prepared to roll your eyes a lot. But the archive is a great place to research an issue and quite often the gem you need is there.

The carnivorous plant listserv started 30 November 1990 with a posting by Barry Rice that was forwarded by the e-mail server to three other members. Today there are about a dozen postings each day forwarded to over 1000 members. Rick Walker, past president of ICPS, is responsible for the listserv. Pete Thiel is responsible for the e-mail archive.

The ICPS web site is located at http://www.carnivorousplants.org/. Click on CP Listserv to get to the section on the archive. There are instructions on how to subscribe to the list and participate directly. By participating directly, you get your carnivorous plant fix daily or even hourly via e-mail.

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Building a Windowbox Micro-Bog for Urban Environments

Kit Halsted • 218 Fifth Avenue #3 • Brooklyn, NY 11215 • USA • kit@carnivorousplants.nyc.ny.us

Keywords: cultivation: bog-garden.

For some time, I have wanted to build a mini-bog in my back yard. Unfortunately, I do not have a back yard and I am not likely to for at least a couple of years. In this article, I will describe the construction of, not a mini-bog, but a micro-bog. A micro-bog is a very small bog suitable for placement on a window ledge, a fire escape, or just about anywhere else with some sun and air. I will describe construction materials and their sources in addition to the process of building the micro-bog.

Materials Needed

The materials necessary to construct a micro-bog include "planters" (i.e. large growing containers) and soil.

My window ledges are 84 cm (33 inches) by 30 cm (12inches), so I got planters that measure 76 cm (30 inches) wide by 25 cm (10 inches) deep by 25 cm (10 inches) tall. I would have preferred something taller, but I could not find anything that would fit on my window ledge. Planters should be at least 25 cm (10 inches) deep if you plan to grow *Sarracenia*, but they can be as little as 15 cm (6 inches) deep if you are only planning on growing the other carnivorous plants I mention in this article.

My planters were US$9.97 each at a general store in Brooklyn, New York; you will probably have to find another source unless you are my neighbor. Each planter has two drainholes in the bottom with removable plugs. Two planters (one nested in the other) are required to make a micro-bog. I use two planters nested like this to allow for drainage from the primary planter and to provide a dead air space layer around the micro-bog's soil for insulation in cold weather. I hope that allowing the primary planter to drain through the bottom will minimize mineral buildup in the micro-bog.

A piece of wire mesh or chicken wire large enough to cover the planter is a good idea if there are squirrels or pigeons in your area.

The micro-bog would probably be fine with a standard carnivorous plant soil mix of 50/50 *Sphagnum* peat moss and sand, but I use a more complicated approach that involves two different layers of planting mix. The base soil mix consists of 2 parts sand to 2 parts peat to 1 part Hartz "pH 5" brand cat litter. The cat litter I use is, as you may have guessed, made by Hartz, and has a pH of 5. This particular brand of cat litter is pure Georgia clay; I add it to the mix because I am unable to get pure silica sand, and the low pH of the clay should help to ensure that the final mix is acidic enough for the plants. Growers unable to purchase this exact brand should shop carefully for a replacement, or use silica sand instead. Over top of the base soil mix I place a layer of chopped long-fiber sphagnum, followed by a thin layer of 50/50 peat/sand.

It costs less than US$15 to buy enough peat moss, cat litter, and long-fiber *Sphagnum* for a micro-bog. Buying sand is a source of irritation for me—I cannot find pure silica (except by the truckload) and my local Home Depot has stopped carrying the Quikrete Play Sand that I used to use. Ultimately, I got my sand from a huge pile that appeared at a construction site around the corner a couple of months ago. While I was there, I picked up a couple of small pieces of granite with which to block the drainage

holes in the planter. I mention this not in order to send hordes of carnivorous plant enthusiasts out to raid construction sites for soil, but rather to illustrate the fact that it is often possible to find materials in unorthodox places when you can not find them by regular means. (*It is, of course, best to be law-abiding at all times—ed.*)

In my set-up, the minimum soil requirements are a bit more than 11 liters (3 gallons) of sand, 11 liters (3 gallons) of peat moss, 6 liters (1.5 gallons) of long-fiber sphagnum, and 2 small pieces of granite. Adjust accordingly if you use a different size planter or if you want to experiment with the cat litter like I did. The ratios of cat hair and cigarette ash I add to my soil are a closely-held secret.

Plants for the Micro-Bog

I want to start the plants in my micro-bog from seed instead of from live plants, so in this section I will tell you which species I chose for my Eastern US micro-bog. There are a couple of requirements for the seed. The plants should grow in a similar climate to yours, and should not get larger than the micro-bog will support. Here is what I plant and why.

Drosera intermedia—I have seed from my existing plants, and it grows like a weed. Along with the other *Drosera*, this provides instant gratification while I am waiting for the *Sarracenia* and the *Dionaea*.

D. anglica—I got this seed from the ICPS seedbank. I have not grown this species before, and it seemed a logical choice for an Eastern US bog.

D. rotundifolia—Also from the seedbank, this was the first carnivorous plant I ever killed. I wanted another chance, and the reasons I am growing the other *Drosera* apply here as well.

D. filiformis var. *tracyi*—More seedbank seed. This should give me some tall plants in the first year.

Dionaea muscipula—Also seedbank seed, if you have to ask why I am growing *D. muscipula* you should instead be asking why you joined the ICPS!

Sarracenia minor—Seedbank again. This species of *Sarracenia* will provide a tall plant to give some variety to the bog, but it does not require as much root depth as, say, *S. alata* or *S. flava*. If I was not already growing *S. oreophila* and *S. leucophylla*, I might have opted for one of the *S. rubra* subspecies, but I already have "normal" shaped pitchers and I do not have the unique shape of *S. minor*.

S. purpurea subsp. *venosa*—I got this seed from Niagara Exotics (niagaraexotics.com). I went with *S. purpurea* subsp. *venosa* over *S. purpurea* subsp. *purpurea* because, although *S. purpurea* subsp. *purpurea* is native to my local climate, *S. purpurea* subsp. *venosa* is a better fit with the other plants in the bog.

Putting It Together

Soak the long-fiber sphagnum in pure water for a couple of days before you start, or in very hot pure water for a couple of hours if you are in a hurry. Pull the drainage plugs out of the planter that will be on top, then stack it on top of the other planter. Place the small pieces of granite over the open holes in the upper planter to prevent the soil from falling through. Think about where the planter is going to end up and where it is now: the finished micro-bog will weigh something like 18 kg (40 pounds). Wash the sand—do it very, very thoroughly if you are using low-grade sand like I am. Put the washed sand and peat (and the cat litter if you are using it) into a bucket or other mixing container. I tried to put the soil ingredients in the planter and mix them there; it was a bad idea. Mix the soil together with lots of pure water and, assuming a 25 cm (10 inch) deep planter, dump it into the planter to a depth of roughly 20 cm (8 inches), making "hills" and "valleys" so most of the soil ranges from 19-22 cm (7.5-8.5 inches) deep. Take a large knife and cut the long-fiber sphagnum into cubes roughly 2.5 cm (1 inch) on a side, then put the sphagnum over the soil in an even layer. Use some of the remaining

peat/sand mix to cover the sphagnum chunks with about 6 mm (0.25 inches). The idea is more to fill in the gaps in the sphagnum than to add an actual layer of soil. At this point, it is time to sow the seeds. You will want a bit more peat/sand to cover them and it should be very dry, so if the only peat/sand you have is wet you may want to dry it out.

I sowed the larger seeds by dumping the packet out onto a piece of blank white paper and gently shaking the paper over the planter so that the seeds fell off one or two at a time, moving the paper from one end to the other slowly so that the seeds were evenly distributed. You can mix the seeds with fine sand and spread the resulting mixture over the surface of the soil, or if the seeds are still on the flower stalks you can simply cut the stalks off and twirl the seed pods between thumb and forefinger while holding them above the planter. The *Drosera* seed from the seedbank seemed a bit trickier to deal with at first: the tiny seeds were clinging to the waxed paper due to static electricity. As it turned out, the static worked to my advantage: I held the waxed paper seed-side down and flicked it hard, then moved it over a few inches and flicked again. The static was holding the seed to the waxed paper strongly enough that only a few seeds fell off each time I flicked it.

Once the seed was sown, I covered the planter with a very thin layer of dried peat/sand. According to the literature, most of the seed I planted should not be covered, but I covered it in order to keep it from blowing away over the winter. After that, I attached the wire mesh to the planter and wrestled it out onto the fire escape. The final step for me was drenching the soil with 3.8 liters (1 gallon) of Trichoderma water, but that is a subject for another time.

Spring 2002 update: In May, following the creation of the micro-bog, I thought that it was a complete failure. But two weeks later showed me that the only problem was my impatience. Staring intently at the soil surface revealed that there were tiny *Drosera*, minuscule *Sarracenia*, and at least one little Venus Flytrap beginning to grow.

I will make this article and the updates available on my web site at www.carnivorousplants.nyc.ny.us.

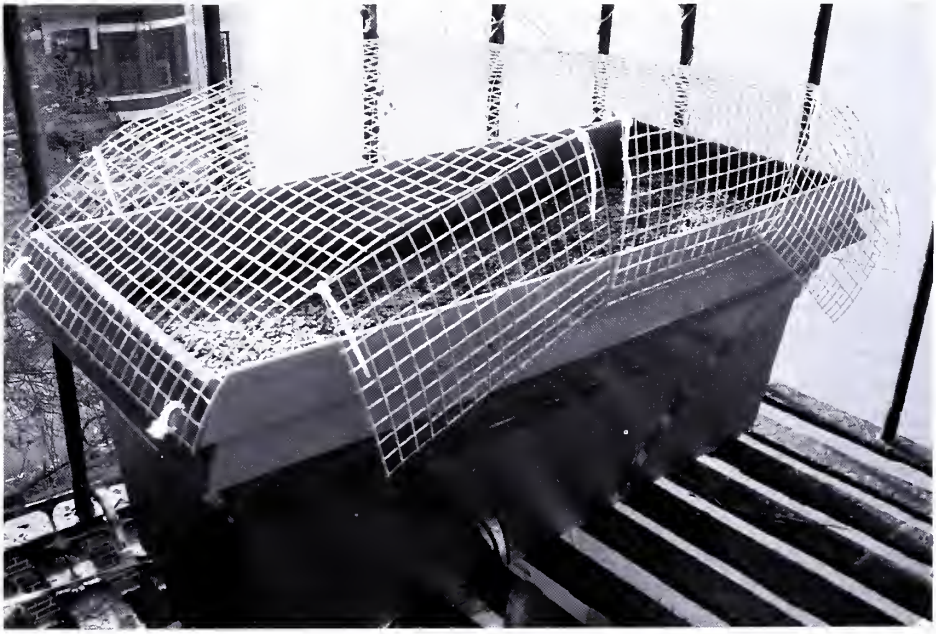

Figure 1: The newly constructed micro-bog.

A Method for Growing *Aldrovanda*

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Keywords: cultivation: *Aldrovanda vesiculosa*, planting media, water.

Aldrovanda vesiculosa, the waterwheel plant, with its relationship to the Venus Flytrap and its gorgeous translucent leaves, is a highly desirable species of carnivorous plant to grow, and yet it has a reputation as being very difficult to maintain in cultivation. Lubomír Adamec, in his many fascinating articles published in Carnivorous Plant Newsletter and elsewhere, has deciphered the fine points of its mineral nutrition (*e.g.* Adamec, 1995, 1997).

However, growing *Aldrovanda* using carefully prepared mineral supplements as Adamec describes may be beyond the means of many amateur growers. This article describes a method of cultivating *Aldrovanda* which has worked very well, using untreated tap water and local soils from two different parts of the US (Figure 1). The soils used ranged from heavy black loam, to infertile red clay, to a version of the latter which was enriched with compost. This method has performed very well with Aldrovanda plants from Japan, Poland, Northern Territory (Australia) and New South Wales (Australia). Recently acquired plants from Romania and the southwestern corner of Western Australia also are responding very well to this method.

First, select a container, preferably a glass aquarium 20 liters (5 gallons) or more in volume. Growing containers with transparent sides are best because light passing into the container through its walls will encourage additional growth of *Aldrovanda*, and some of the most attractive views of the plants will be through the sides. However, the container may be a translucent (i.e. semi-transparent) or even opaque, as can be purchased in the USA for storing and organizing shirts or books.

Place 1-5 cm (0.5-2 inches) of soil (of any type, from fertile loam to heavy clay) in the bottom of the growing container. The heavier soils seem to work better, though this has not been tested systematically. Then fill the container with tap water to a depth of 15-20 cm (6-8 inches) above the soil. This method has not been tested systematically for helping plants cope with fluoridation or chlorination, and it has not been tested with very hard water. It has, however, been tested using moderately hard water in the Eastern US. If hardness might be a particular concern, the dilution of local tap water with distilled water might help, or allowing the companion plants mentioned below a few weeks to condition the water before adding the *Aldrovanda* might also be a useful aid.

Distilled water as the only source of water can be used if you prefer, though may not be necessary. You might want to temporarily cover the soil with something like a plastic sheet while adding water to avoid having too much soil material polluting the water. A thin topping of sand over the soil will work as well. In any event, it is not crucial as the particles will settle within a day or two.

Once you have added the water, drop in two water hyacinth plants (*Eichhornia crassipes*; Pontideriaceae) about 15 cm (6 inches) diameter each, or an equivalent amount of larger or smaller plants. While I think that water hyacinths are best, other floating plants may be used instead, or as supplements. They will not be bothered if the water is still murky. The cultures can be given full sun through partial shade—water hyacinths are adaptable, as are the *Aldrovanda*. Plants will grow in any temperatures above which they do not go dormant and form turions, as discussed more fully below, and even in very warm water on a day when the temperature in the greenhouse tops 40°C (104°F), plants will thrive. These cultures can take whatever natural photoperiod is available, but they will also grow well given constant temperature (20-25°C, 68-77°F) and 24 hr artificial light.

Figure 1: Three different strains of *Aldrovanda* in cultivation.

The water hyacinths can be allowed to grow to cover the surface of the aquarium. Enough light will filter between and through the plants to sustain the *Aldrovanda*. In fact, the *Aldrovanda* will thrive, and red forms produce excellent coloration (although not all plants will be red—I am trying to determine why this is the case).

Why does this simple method work for growing *Aldrovanda*? A good guess might be that the presence of the water hyacinths does two things. Water hyacinths are very good at conditioning water—they are even used in some stages at some sewage treatment plants. So, they may condition the water to the liking of the notoriously finicky *Aldrovanda*. Since the water hyacinths grow quickly, they may also help deplete extra nutrients from the water that would encourage algae to grow—algae can be a significant problem for some *Aldrovanda* growers.

In addition, water hyacinths have a large mass of roots with a large surface area. When this system is used, and a tank is illuminated from above, large numbers of small crustaceans and other aquatic creatures can be seen swimming into the roots, resting on them, and swimming out again. The root mass may provide a place for prey of *Aldrovanda* to breed, further benefiting the plants of interest. For this reason, it is a good idea to add some pond water or water from an established tank to a new tank of *Aldrovanda*. This addition acts as a starter culture. For the same reason, some pond snails or a similar type of snail should be added to the tank as *Aldrovanda* will capture and digest baby snails.

With this method, growing *Aldrovanda* should be significantly easier for those without access to the sort of chemical supplements described in Adamec's articles. Turions can be dropped into a tank as a new growing season begins. I have found that the red Northern Territory form will overwinter in a cool greenhouse using this method. Even though this strain is tropical in origin, it will make terminal buds which look like turions after some weeks of approximately 10ºC (50ºF) temperatures at night. These can be converted to true turions by placing the plants in 4ºC (39ºF) storage in the refrigerator. Plants which are left in culture without being stored may remain semi-active through the winter, resuming growth in the spring.

Dead whorls of leaves will be shed from behind the turion without damage to plants or spoiling the stored turions. Others might as well, but I have not tried them yet. Instead, I have collected the turions for these other varieties in October/November and stored them at 4ºC (39ºF) in pond water until April. Closed rigid containers are useful for this purpose. Do not include soil. When temperatures begin to warm, turions can be dumped into the same sort of culture from which they were taken, with growth resuming within days,

With this technique, increases of 10 fold in the number of plants (measured by counting growth tips) can be achieved in a month or so, given warm weather and adequate light. Adequate light can be anything from the level of light found in heavy shade on a

bright, sunny day to full sun. In the latter cases, companion plants provide some shade to the *Aldrovanda*, which will often remain partly shaded. Starting with just a few plants at the beginning of the growing season, you can expect to have fifty plants growing in a 20 liter (5 gallon) container for more active strains, such as the Australian varieties, and other types will increase vigorously as well.

Note that water hyacinth can be a significant invasive species in wildlands, where it can adversely affect native biodiversity, recreation, and agriculture. This species is even prohibited or regulated in Arizona, Florida, South Carolina, regions of Australia, and is probably prohibited or regulated in other areas, too. Plant growers are reminded not to introduce water hyacinths to the wild.—ed.

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International Carnivorous Plant Society Seed Bank

ICPS Seedbank• P.O. Box 72222 • Davis, CA 95617-6222 • USA

Darlingtonia californica—Oregon, USA
Drosera aliciae
D. auriculata
D. binata
D. burmannii
D. capensis—narrow leaf
D. capensis 'Albino'—white flower
D. capensis—wide leaf
D. capillaris
D. collinsiae
D. dielsiana
D. filiformis var. *filiformis*
D. gigantea
D. glanduligera
D. intermedia
D. intermedia—Florida, USA
D. intermedia—North Carolina, USA
D. intermedia—Rhode Island, USA
D. macrantha subsp. *macrantha*
D. nidiformis
D. spatulata
D. stolonifera subsp. *stolonifera*
D. × *tokaiensis*
Pinguicula caerulea
P. lutea
P. primuliflora
Sarracenia alata
S. flava
S. leucophylla
S. psittacina
S. purpurea subsp. *purpurea*
S. purpurea subsp. *venosa*
Utricularia gibba
U. multifida
U. violaceae

This is a partial list of the seeds available. A complete list is available online at the ICPS web site, http://www.carnivorousplants.org or by sending a self-addressed (stamped if USA), envelope to the seed bank address.

Seed packets are US$1 each. Please include US$3 postage and handling for each order. You may pay by cash, check, or money order in US$. Many members pay with cash. Please make checks and money orders payable to "ICPS Seed Bank".

The seed bank is a members-only benefit. The quantity of seed available to each member is 1 packet of each variety per month and 50 packets total in any 12 month period. Please list alternative seed selections, as other orders will arrive before yours. If you have an e-mail address, please include it so we can correspond should any issues arise. Seeds purchased through the seed bank are intended for your personal use only and may not be sold.

The money raised by the seed bank is used by the ICPS to pay for seed bank expenses, web site ISP charges, and ICPS educational and conservation programs. Donate seed and get credit for free seed from the seed bank. Seeds of selected varieties are available free to teachers for use in the classroom and to scientists and conservation organizations. It is ICPS policy not to sell seed of plants protected by CITES Appendix I or the US Endangered Species Act.

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Genlisea lobata Fromm-Trinta

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Keywords: cultivation: *Genlisea lobata* — travelogue: Brazil, *Genlisea lobata*, *Utricularia longifolia*.

In 1977, the genus *Genlisea* was split into two sections: sect. *Genlisea* and sect. *Tayloria* (Fromm-Trinta, 1977). The latter section included a single species at the time—*G. violacea*—which has seed pods that split into two longitudinal valves. Section *Genlisea* included all remaining African and New World species, which have seed pods that are nearly unique among flowering plants in that they are circumscissile, splitting at the "equator" and at two further "latitudes" towards the apex (Taylor, 1991). Later, the new species *G. uncinata* P.Taylor & Fromm-Trinta (Taylor & Fromm-Trinta, 1983), and then *G. lobata* Fromm-Trinta (Fromm-Trinta, 1989), were added to section *Tayloria* by being split off from *G. violacea*. More are on the waiting list—over the past decade I have found four or five new Brazilian populations of plants which probably merit new species status.

Genlisea lobata was described only ten years ago. It was discovered in eastern Brazil at the Serra do Caparaó (the mountain range on the border of the states Minas Gerais and Espírito Santo). Until the 1960s, the Serra do Caparaó was believed to contain the highest mountain in Brazil—the 2890 m high Pico da Bandeira—until two higher peaks (Pico da Neblina, 3014 m, and Pico 31 de Março, 2992 m) were discovered on the isolated Brazil-Venezuela border.

I have been to the Serra do Caparaó on three occasions, and while my main purpose was to locate *G. lobata*, numerous interesting carnivorous plants were found each time (including *G. aurea* St. Hil, *Drosera villosa* St. Hil, and *Utricularia reniformis* St. Hil.). On my first trip (June, 1993) I only found a single small population of *G. lobata*, growing at approximately 1300 m altitude on mosses along a partly shaded stream. The plants were in full bloom (Figure 1).

As described by Fromm-Trinta (1989), each *G. lobata* rosette is composed of a few spathulate leaves, each 7-12.5 mm long by 1.5-3.5 mm wide at the apex. The inflorescences are covered in simple and glandular hairs and reach 22 cm in length (they are usually around 10 cm long), each bears up to 14 flowers, of which only one to three are open at any given moment. The pedicels reach 13 mm in length and become reflexed after pollination. The bilobed flowers are 8.5-10 mm in length. The flowers I saw were white with an orange-yellow mark at the base of the lower lip with several vertical, dark-purple streaks on the upper lip. The spur was entirely deep-purple in color.

When I returned to this site on the Serra do Caparaó for the second time (October/November, 1995) it was the end of the dry season and to my surprise there was no sign of *G. lobata*—it is an annual! Like *G. violacea*, it probably dies out at most sites towards the end of the dry season, but hangs on as a perennial at those few sites which stay moist year-round.

On my third trip to the Serra do Caparaó (February, 1996) too much time was used to climb the Pico da Bandeira and explore the carnivorous plants along the trail, so no time was left for *G. lobata;* it was too dark by the time we returned from the summit. Strangely enough, no further *G. lobata* sites were found on these highlands. The type location is somewhere along the long road that leads to the start of the summit trail, but *G. lobata* was not seen along this road (N.B. a friend did find some later, in 1999).

In early 1996 I visited the Serra da Araponga, less than 100 km to the west of the Serra do Caparaó. I went there in search of a *Drosera villosa* but got much more than I

Figure 1: *G. lobata* at Serra do Caparaó.

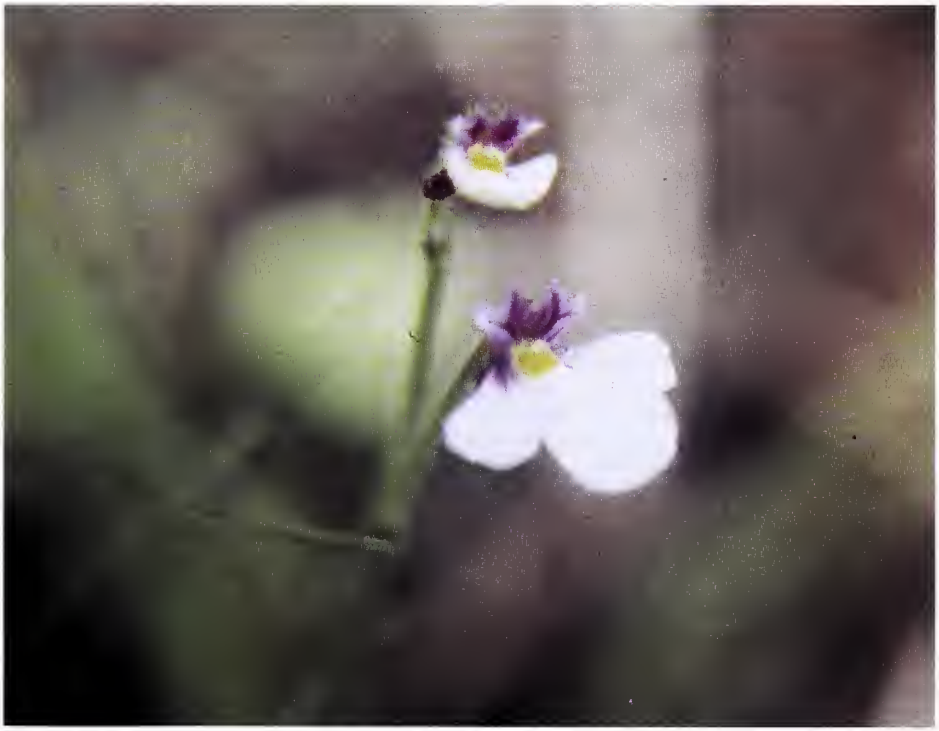

Figure 2: *G. lobata* from sunny sites at Serra da Araponga.

bargained for. Near the top of the Serra do Araponga, above 1350 m altitude, the rainforest gives way to grassy mountainsides. When we arrived, these areas were very wet (even boggy), and *U. longifolia* Gardner leaves and inflorescences were growing as thick as a grass lawn. Curiously, the inflorescences were highly branched, each bearing several large pink-purple flowers. Most interestingly though was that about half the *U. longifolia* population had pure white flowers, with only the yellow mark on the lower lip! The leaves of these plants were an overall light-green in color, with no red pigmentation (i.e. what many carnivorous plant growers call albino plants).

Around the *U. longifolia*, we found plenty of *G. lobata* and, partly shaded by grasses, *D. villosa* plants forming curiously long stems. I was more than overjoyed and happily surprised to find *G. lobata* on the Serra da Araponga, since it was previously only known from two locations on the nearby Serra do Caparaó.

The *G. lobata* plants at the Serra da Araponga were growing in humid sandy soil, semi-shaded by grasses. Plants growing in sunny areas had flowers colored like those of the specimens I had seen at the Serra do Caparaó (Figure 2), but in shady spots the white background was instead light-lilac with light-purple streaks on the lower lip, reminding me very much of its close cousin *G. violacea*.

G. lobata is surely very closely related to the more widespread *G. violacea*, and both have very similar requirements in cultivation. These two species can be grown as perennials and pollination must be done by hand to ensure seed set. If the pedicel remains erect after the flower drops off, the pollination was unsuccessful, but if the pedicel bends downwards, watch the developing seed capsule so as to not miss the seeds when the capsule splits. Germinating the seeds is a whole different story: Good luck! It seems that some kind of dry stratification helps. Sow the seeds, water them once or twice, and then let the pot dry for a few weeks (or months). Keep it moist again, thereafter.

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Taylor, P., and Fromm-Trinta, E. 1983, Uma Nova Espécie para o Gênero *Genlisea* St. HiL. sect. *Tayloria* (Lentibulariaceae): *Genlisea uncinata* P.Taylor & Fromm-Trinta, Bradea 3: 365-368.

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Schulze, W., Schulze, E.D., Schulze, I. & Oren, R. 2001, Quantification of Insect Nitrogen Utilization by the Venus Fly Trap *Dionaea muscipula* Catching Prey with Highly Variable Isotope Signatures. Journal of Experimental Botany 52: 1041-1049.

Although fashionable among ecologists, stable isotope ratio analyses of carnivorous plant extracts are less convincing than simple identification of carcasses in the traps or tracer feeding studies. As long as isotope selectivity in the absorption of nutrients or during metabolism in the plant cannot be ruled out, and if no attempt is made to determine the physiological fate of specific metabolites, the mere isotope ratio is actually of rather limited informative value, unless someone doubts that nitrogen is taken up at all from the prey in the two species discussed. Nevertheless, the two cited papers are amusing examples of elaborated scientific proof for the obvious. (JS)

The 4th International Carnivorous Plant Conference
Tokyo, Japan, June 21 - June 23, 2002

Jan Schlauer • Zwischenstr. 11• 60594 Frankfurt, Germany

Keywords: outreach.

Held at the National Science Museum and organized by Prof. Katsuhiko Kondo with cooperation of the Insectivorous Plant Society, Japan, this fourth ICPS conference was the first in the Asian region, and it attracted an impressive audience of 132 registered members from 16 countries, the Japanese fraction (84) obviously being the largest, followed by the United States (13), German (7), Indian and Australian (4 each) delegations. As far as I know this was the first ICPS conference with Korean (3), Mongolian (3), Sri Lankan (2), and Bangladeshi (1) participation, which clearly demonstrates the beneficial effect of changing venues across the globe.

The program was as diverse as the participants, including lectures on systematics/taxonomy of *Drosera* (M. Hasebe, Okazaki City, Japan; Y. Hoshi, Omuta City, Japan), Lentibulariaceae (L. Legendre, Sydney, Australia), *Heliamphora* (A. Wistuba, Mannheim, Germany), and *Nepenthes* (S. Kurata, Tokyo, Japan), field studies on *Nepenthes* (C. Clarke, Hong Kong, China; J.H. Adam, Sabah, Malaysia; M. Hotta, Kagoshima, Japan; C. Lee, Sarawak, Malaysia), *Pinguicula* (C. Shibata, Tokyo, Japan), and *Drosera* (S. Hartmeyer, Weil/Rhein, Germany), physiology of *Nepenthes* (T.P. Owen, New London, USA; K. Takahashi, Tokyo, Japan), a comparison between carnivorous and parasitic plants (D.M. Joel, Ramat-Yishay, Israel), cultivation and plant-animal interactions of *Aldrovanda* (D.W. Darnowski, Chestertown, USA), the carnivorous plant collection at Fullerton (L. Song, Fullerton, USA), and carnivorous plant biogeography (J. Schlauer, Frankfurt, Germany). A special symposium was devoted to the leaf blade movements of Droseraceae (S.E. Williams, Annville, USA; W.R. Fagerberg, Durham, USA; K. Kondo, Hiroshima, Japan; M. Ueda, Keio, Japan).

Two workshops on commercial carnivorous plant cultivation and on carnivorous plant conservation, and a poster session with 22 presentations completed the official schedule. As usual, the many discussions both after lectures, in the breaks between them, and during the banquet added most interesting aspects to the already impressive event. A display of collections of carnivorous plants (needless to say that plants on display are always in the best of all possible conditions in Japan) and several sales booths on different floors of the National Science Museum yielded welcome illustrative material and new contributions to quite a number of collections.

Proceedings (222 pages) of the conference have been issued by Prof. Kondo, Hiroshima University, Japan (ISBN 4-9901285-7-5).

Optional post-conference field trips visited Japan's carnivorous plant treasures, viz. the endemic species *Pinguicula ramosa* in its habitat, Mt. Koshin, the absolutely phenomenal *Byblis* greenhouse of Isao Takai's nursery, and the last remaining Japanese locality of *Aldrovanda vesiculosa* (where also the second Japanese endemic, *Utricularia dimorphantha* is cultivated successfully). Another trip was offered to the Nansou Carnivorous Plant Garden.

I would like to take this opportunity to thank all persons who made this breathtaking series of events possible, in the first line Prof. Kondo and the organizing committee, the Insectivorous Plant Society, Japan (Prof. Komiya, Dr. Shibata), the National Science Museum (Prof. Konishi), and Isao Takai.

Growing Carnivorous Plants in the UK

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Keywords: cultivation: Great Britain — live collections: Kew.

Here is the story of how I brought some Mediterranean atmosphere to the green climate of England.

A little while ago, I decided to travel and work abroad, so I spent April through June 2001 working at Kew Gardens, in London. It was a great opportunity for me to work in what is maybe the most important botanical garden in the world.

Kew Gardens were founded in 1759. Today 550 people work there, of which 200 are gardeners, 150 are scientific staff, and the others are technical and support staff. The library contains more than 130,000 volumes and 4000 periodicals. The herbarium, one of the largest in the world, contains seven million specimens. The plant and seed collections are the largest in the world.

The Garden has about 40,000 kinds of plants on view for the public—the rest are grown in the more secure environment of the Garden's nurseries. There are three greenhouses open to the public: the temperate house, the tropical house, and the Conservatory. The Conservatory is for the most precious and interesting collections (cacti, carnivorous plants, orchids, ferns, bromeliads, aroids, etc.).

Not accessible to the public is a temperate nursery and a tropical nursery. Each nursery is about as large as the three greenhouses all together.

When I arrived at Kew in April, the specimens on display were very large and nice (such as their *Sarracenia flava* var. *rugelii*), but apart from a large *Utricularia reniformis*, the most precious stuff was in the nursery, far from danger by being damaged by too curious people or kid's hands. In the previous year almost all of the carnivorous plant collection had been lost because of the poor quality of water. However, Kath King, from Perth Australia, was now in charge of the carnivorous plants and was working to rebuild the carnivorous plant collection.

The tropical nursery contains a coolhouse for *Sarracenia*, *Drosera*, *Pinguicula*, *Cephalotus*, *Dionaea* and *Drosophyllum*, and a warm house for *Nepenthes*, *Heliamphora* and some tropical *Utricularia*. *Darlingtonia* and temperate *Pinguicula* (such as *P. grandiflora*) are grown outside. *Byblis gigantea*, *P. primuliflora* and some other *Nepenthes* and *Heliamphora* are kept in a well-lighted bromeliad greenhouse.

In the warm house, *Nepenthes* cover a full bench almost 2 meters large and about 10 meters long. I remember best the specimens of *N. hamata* (pitchers 15 cm long), *N. pervillei* (plant is 30 cm large), *N. macfarlanei* (pitchers 25 cm long), *N. rajah* (plants 15 cm large), *N. northiana*, *N. merrilliana* and *N. madagascariensis*. There are many other interesting species including *N. hirsuta*, *N. treubiana*, *N. veitchii*, *N. reinwardtiana* (80 cm tall), *N. bongso*, *N. ramispina*, *N. sanguinea*, *N. maxima*, *N. ventricosa*, *N. tobaica*, *N. mirabilis* (1-2 meter plants), *N. thorelii*, *N.* × *mixta* (1-2 meters tall), and *N. tobaica* (80 cm tall), etc. Before you have a heart attack, you should know there are no giants. Still, even if they need a lot of love and care to become 2-3 meters climbers, they are healthy, large and strong.

The warmhouse also has *U. alpina*, *U. calycifida* and *U. prehensilis*, *U. reniformis*, *U. praelonga*, *U. tricolor*, *U. pubescens* and *U. bisquamata*.

The coolhouse has 10-20 specimens of every *Sarracenia* species, about fifty

Dionaea, about thirty *Drosera* species (tuberous, pygmies and others; 1-10 specimens of each). There is also *U. sandersonii*, *U. dichotoma*, *U. livida*, and *U. bisquamata* from Betty's Bay; other plants include Mexican Pinguicula (*P. laueana*, *P. gypsicola*, *P. esseriana*), *P. primuliflora*, *P. lusitanica*, a flowering *Cephalotus* (20 cm across), 3-4 *Drosophyllum*, *Byblis gigantea* and an elegant, 25 cm tall *Roridula dentata*.

The best, red *Heliamphora nutans* and *H. heterodoxa* are in the *Nepenthes* house. More *H. nutans*, *H. minor*, a nice flowering *B. gigantea*, *N. rajah* and *N. macfarlanei* are quite happy in the bromeliad house, which is a well-lit, relatively low humidity environment.

On 21 April Kath King and I attended the annual general meeting of the UK Carnivorous Plant Society, held at the Reading University, near London.

I met a lot of people from the Carnivorous Plant Society, and saw the University collection, wealthy with some huge *S. minor*, a lot of healthy *Drosera*, trays filled with red *Dionaea*, a deep purple *Drosera binata* and other colorful plants. After some lovely tea and biscuits we listened to some lectures; I read a short speech encouraging collaboration of carnivorous plant societies. For example, I encouraged collaboration between the UK Carnivorous Plant Society and Kew Gardens. At the end, Kath King agreed in promoting a better and more intense collaboration between the Kew Gardens and the Carnivorous Plant Society, and in August there will be an open day in the Kew tropical nursery specifically for the Carnivorous Plant Society.

On the 25 of May I visited the Chelsea Flower Show (see Figures 1, 2). (My ticket was provided free, compliments of the Carnivorous Plant Society.) I spent most of the day talking with the growers in the three carnivorous plant stands: the UK Carnivorous Plant Society (silver medal winner), South West Carnivorous Plants (silver medal winner) and Hampshire Carnivorous Plants (gold medal winner). You can really feel the 25 years of the UK Carnivorous Plant Society's history, talking with the kind and always available people. They know everything! In few hours I learned how to feed *Utricularia* with nematodes to make them flower (Paul McKeown, seed bank manager), I listened to different opinions about Don Schnell's classification of the different varieties of *S. flava* (Matthew Soper of Hampshire Carnivorous Plants, Chris Crow of *Sarracenia* Nurseries), I know a lot more about neon lamp brands (Alistair Pearce of South West Carnivorous Plants), and heard about the history of the UK Carnivorous Plant Society (Steve Cottel, chairman). They also provided me ideas (Alan Haines, web builder and Malcolm Goddard, newsletter editor) on how to improve the Italian Carnivorous Plant Society.

The specimens on display were fabulous: *U. reniformis* and *U. longifolia* var. *forgetiana* covered with flowers, perfect and giant *S. psittacina*, *S. flava*, *S. minor*, shining, emerald-like *Darlingtonia*, *P. moranensis* with white flowers, *P. crystallina*, *P. laueana* and many others with plenty of flowers. Also present were vast numbers of tuberous and pygmy *Drosera* (including a magnificent *D. gigantea*). While *Cephalotus*, *Heliamphora* and *Nepenthes* are my main interest—and the specimens of them there were beautiful—I almost ignored them, as I was completely taken by the beauty of all the rest.

I helped dismantle the stand and load the plants onto a truck at the end of the show. It was half past nine in the evening when, tired by the intense day but enthusiastic for all the growing information I learned, I returned home.

While I worked at Kew, Phil Wilson and Paul McKeown often visited Kew to help Kath King with the identification and the cultivation of the plants. As a bonus, they often brought spare plants. I was present during one of these visits. I remained in silence while they found tens of incorrectly labelled *Drosera* pots. All those sun-

Figure 1: The Carnivorous Plant Society's display at Chelsea flower show, 2001. Photo by Alan Haines.

Figure 2: The Carnivorous Plant Society's display at Chelsea flower show, 2001. Photo by Alan Haines.

dews that to me were simply all *D. spathulata* (sundews are not my specialty), were recognized with amazing ability and quickness. We spoke about Kew's *Sarracenia rubra* subspecies, about a strange *N. macfarlanei* that may actually be a hybrid, about *Pinguicula ehlersiae* and how often it is sold as *P. cyclosecta*. Over biscuits and a cup of tea, they related what Kew's carnivorous plant collection was like in the past, they recounted tales of *Drosera* floating on the water in some bogs on the Tepuis, they described floating *Pinguicula primuliflora* in some American lakes, and discussed horticulturists performing such feats as growing huge *H. tatei* grown as an epiphyte on a slab of bark and some lucky people who are growing rope-size *Aldrovanda* in ponds where the conditions are perfect.

On 14 June I met the famous Martin Cheek in the Kew Herbarium. Martin is the professor who has done a great deal of work in the study of *Nepenthes* taxonomy. If you look carefully in your carnivorous plant books, after names such as *N. argentii*, *N. aristolochioides*, *N. danseri*, *N. diatas*, *N. lamii* and *N. macrophylla* you will read "Jebb and Cheek". He is that Cheek. Martin has been working at the Kew Herbarium on a long-time project classifying South African flora, but my visit gave him an opportunity to return to one of his favourite genera: *Nepenthes*. Martin is a very kind person, he always speaks slowly with a low voice—almost whispering and hypnotizing. When he speaks about *Nepenthes* you can see in his eyes the shine of someone who has, for his passion, the curiosity and the enthusiasm of a child. He delighted me for an hour of his precious time with some words about the differences between *N. burkei* and *N. ventricosa*, *N. stenophylla* and *N. faizaliana*, and *N. thorelii* and *N. smilesii* (even showing me dried specimens), and described the habitat of the two amazing species *N. merrilliana* and *N. northiana*. He showed me material that Peter Taylor used to write his monograph on *Utricularia* (including even his microscope!).

The 22 and 23 of June were unforgettable. I took the bus from London and after 3 and a half hours I arrived at Culmstock, Devon, in the evening. I was to visit

Figure 3: Mike King's *Sarracenia flava* var. *rubricorpora*, in his 10 meter long greenhouse. Photo by Mike King.

Alistair and his wife Jenny Pearce and their nursery "South West Carnivorous Plants". Al and Jenny are two delightful people—I brought them an Italian wine as a gift, and they offered me a dinner in a local pub. Before it grew too dark, I saw his vast and diverse collection, and was particularly impressed by hundreds of colorful *Sarracenia*, a large tray of *U. sandersonii*, a huge *N. veitchii* (the highland form, with striped peristome), and some giant *Darlingtonia* with their bright heads shining at the sunset light. We spent the whole evening speaking about carnivorous plants, sharing photos, and surfing the web. Since I was visiting with Phil Wilson the next day—only half an hour from Culmstock—Alistair and Jenny kindly offered for me to sleep there, and then to accompany me to Phil's house the next day.

Finally, it was time to sleep. As I dropped into sleep I felt all the romantic beauty of traveling; while the moonlight came through the curtains and a dog was barking somewhere, I realized that I was sleeping on a divan at Culmstock, a small village in the southwest of England.

The following morning we arrived at Phil Wilson's home in Somerset (where also lives Adrian Slack). I gave Phil the second bottle of Italian Moscato and I took some pictures of his extensive collection. There are a lot of rare specimens of many different carnivorous plants: *Roridula gorgonias*, *U. humboldtii*, *U. multifida* in flower, a lidless clone of *S. flava*, *S. leucophylla* 'Schnell's Ghost', etc. I saw some people I had met earlier at the Chelsea Flower Show, and I helped them to put new UK CPS bulletins in envelopes for mailing. Paul McKeown gave me a lift back to London (on the way back I saw Stonehenge!). This drive with Paul was possibly the most instructive conversation of the whole trip as for hours we discussed many different carnivorous plant growing techniques.

It was 7 July when my tired limbs could finally relax—the Kew internship was over and I had more free time to enjoy England. Alan Haines helped me to not get lost with the English trains, and with another bottle of Moscato in hand, we visited Mike King's collection near Birmingham. It was the most beautiful *Sarracenia* collection I had ever seen (see Back Cover and Figure 3). For such a large collection there was a perfect order: all the plants were labelled, the greenhouse windows were clean, the concrete floor was free of rubbish, old pots and compost. All the *Sarracenia* were strong, healthy and colorful, all the dead leaves and spent flowers were trimmed away. Mike did not use greenhouse fans or shades. Instead, the roof windows automatically opened when the temperature rises too much. The plants were obviously happy about the full sun, plentiful rain water and fresh air. Mike was a perfect host, he ran from one guest to the other, answering questions and showing off this or that plant. The food was good and plentiful. And, after showing me around his home—including his supplies of peat and perlite, and a barrel system he uses to collect rain water—he confided to me that these plants are his life. I thought back to when I had first met Mike during a previous meeting of growers and how he always enjoyed showing off pictures of his wonderful *Sarracenia*...I think that anyone would do the same if they had such fine specimens!

On 14 July I travelled by train to meet Matthew Soper, owner of "Hampshire Carnivorous Plants" and winner of a gold medal at the Chelsea Flower Show. For Matthew, I brought along a bottle of light sweet wine from Reggio Emilia. His collection was vast—hundreds of *Sarracenia* species and hybrids and a few *Drosera*. But what most attracted me were his *Nepenthes* and *Utricularia*. With pop music dancing in the air, Matt showed me with pride his thirteen year-old *N. rajah* with a beautiful pitcher about 25 cm long! I saw some beautiful *N. macrophylla* (20 cm pitchers), highland and lowland forms of *N. veitchii* (20 cm pitchers), *N. inermis* (10 cm pitchers), *N. hirsuta* (20 cm pitchers), *N. lowii* (10 cm pitchers), a wonderful *N. veitchii* × *maxima* (25 cm pitchers) and many others. He also showed me his

Heliamphora ionasi (rather small, but you know how slow this species grows), *H. tatei* (10 cm tall) and an unrecognizable, strange *Heliamphora*. I asked him if it was the new, recently discovered *H. hispida*, but he was not sure, as he received it just last year labelled only as a "new species." There were some huge *Darlingtonia*, among which I saw a clone covered with smaller and more numerous windows than usual. He had attractive clones of *Cephalotus* that, just like movie stars, looked stressed because of the too many shows they had taken part in. Matt also had a shocking, giant *S. flava* var. *rubricorpora*—I never before saw a pitcher as large as that! There was a large tray filled with *Utricularia* species, most of them in flower, among which I saw the precious *U. tricolor*, *U. tridentata*, *U. longifolia*, *U. pubescens*, *U. nephrophylla*, *U. blanchetii* and some astonishing *U. praelonga* full of scapes covered with huge yellow flowers. Over tea, we looked at some very interesting *Nepenthes* pictures he took in nature, and three hours went by like they were few minutes. As a note of particular interest, we spoke about how Thailand, Cambodia, Vietnam and Indochina are rarely explored, and how there may be plenty of new species just waiting for brave taxonomists.

The very next day, I made my last visit to a UK grower, meeting Paul McKeown in his house near Watford, north of London. (Paul does not like wine, so I brought him some beer.) His *Sarracenia* collection was suffering because of root mealybugs infesting his plants after the Chelsea Flower Show. (It seemed that all the growers complained about the loss or worsening of many carnivorous plant specimens after the Flower Show.) Paul had great plants, like flowering *Genlisea violacea* and *Genlisea hispidula*, and large specimens of *U. quelchii*, *U. endresii*, and *U. nelumbifolia*. His 10 year-old wonderful, huge *Darlingtonia* was fantastic. But what nearly mesmerized me is his highland *Nepenthes* collection. He had an impressive *N. veitchii* vine (1 meter long), an eight year-old *N. rajah* (along with a few "small" specimens 25 cm in diameter), *N. macrophylla* (pitcher: 20 cm), *N. aristolochioides* (pitcher: 8 cm), *N. sanguinea* (pitcher: 15 cm), *N. maxima* (pitcher: 30 cm), *N. fusca* (pitcher: 20 cm), *N. bongso* (pitcher: 20 cm), *N. spectabilis* (pitcher: 20 cm), *N. mikei* (pitcher: 12 cm), *N. glabrata* (pitcher: 5 cm), and *N. sibuyanensis* (pitcher: 12 cm). In addition, he had many smaller but healthy specimens of *N. pilosa*, *N. burbidgeae*, *N. lowii*, *N. hamata*, *N. ovata* and others. Paul told me more than once that the problems with highland *Nepenthes* were often due to inadequately-developed root systems in plants coming from micropropagation. Another important point was that (apart the usual exceptions like *N. alata*, *N. ventricosa*, *N. khasiana*, and *N. maxima*), these species really did poorly in overly warm conditions. (Paul is using 50% shade and a humidifier that sprays cold fog about every 20 minutes. The temperature, even in summer, rarely goes over the 25°C (77°F) and the night minimum is 12°C (54°F).) Paul said that these two points were more important than what kind of soil is used, or how much humidity and light the plants were given. Once the small plants have developed a strong root system in the cool environment, they will grow quickly and bigger, just like lowland species. The evidence was before me! This was the first time I saw all these highland species growing so big; even the small plants were healthy, with every leaf and pitcher bigger than the previous ones.

Well, that concludes my experiences in the UK. I saw wonderful plants, I learned a lot of new growing tips and I met many friendly, interesting and experienced growers that I wish to thank for their kindness. I hope they enjoyed our discussions as much as I did, and I hope one day, if anyone of them ever come to Italy, we will be able to show off as many beautiful and rare specimens as I saw on my UK travels.

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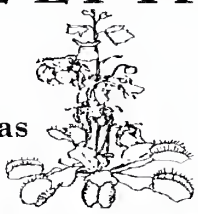

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The editors of Carnivorous Plant Newsletter and the officers of the International Carnivorous Plant Newsletter thank the following authorities for acting as external referees for the papers requiring anonymous peer review in 2002: G. Thor, R. Naczi, L. Mellichamp, L. Adamec, A. Wistuba, and others. Special Correspondents for the ICPS are: S. J. Casper (Germany), R. Gibson (Australia), M.K. Janarthanam (India), K. Kondo (Japan), F. Rivadavia (Brazil), S. Zamudio (Mexico).

Back Issue Sale is Over!

As we have been advertising for the last year, back issues of Carnivorous Plant Newsletter are no longer available. Effective 1 January 2003, only back issues of the current calendar year will be stocked. This will allow new members to receive a full set of issues for the year they subscribe. The ICPS is hoping that in the future, complete back issue sets may be available on CD ROM, but this is a huge project we have really only started to explore.